

New Properties of Bimetallic Catalysts Discovered

Two heads are better than one. And in chemistry, sometimes two catalysts — in a case of true synergism — work better together than both could alone.

So the whole is greater than the sum of its parts. Why should that be?

Chuck Peden, Jack Houston (DMTS), Dianna Blair, and Wayne Goodman (all in Surface Science Division 1134), as part of an ambitious program of basic research in catalysis, have recently discovered some intriguing clues.

Their studies are showing that catalysts composed of two metals in combination act almost as though an entirely new material has been formed, one never before encountered. And they are beginning to see why.

It appears that arrays of the atoms of the two elements attempt to "fit" each other, causing strains on the outer one (the top layer in the drawing on Page Seven). Electronic interactions (exchange of electrons) between the two elements also appear to play a role in their special properties.

These effects change their behavior, sometimes in surprising and beneficial ways. "The most surprising thing is that their electronic properties differ," says Wayne. Their ability to absorb molecules is changed, for example.

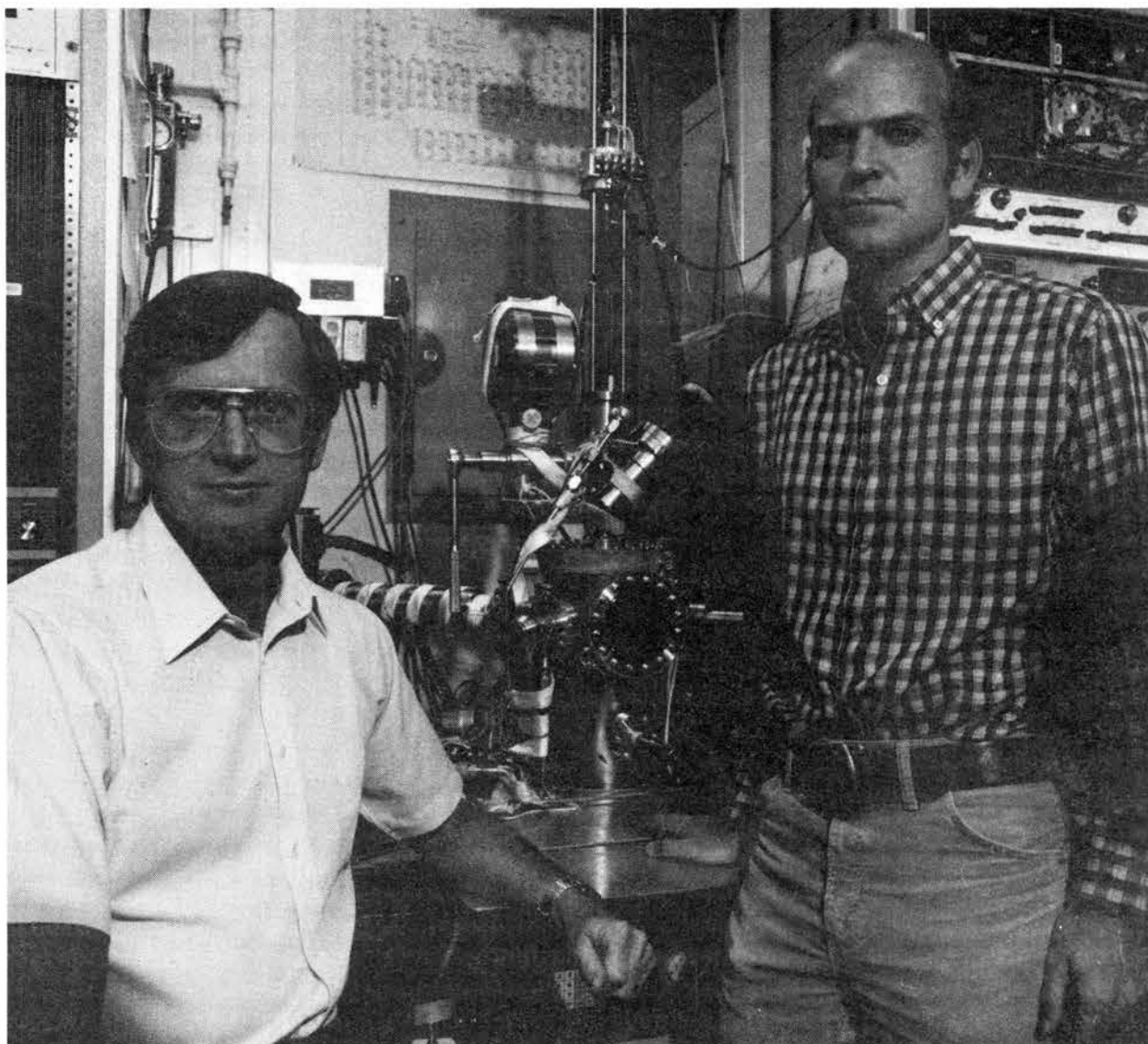
Why does it all matter?

The research is part of a series of studies at Sandia in Solid State Sciences 1100 that is leading to a fundamental understanding of economically important catalytic processes widely used in the petroleum-refining, chemical, and pharmaceutical industries. These studies, in turn, are part of Sandia's surface science work that has grown out of problems in weapon design (more specifically, out of neutron generator design).

To those who haven't encountered a test-tube since high school chemistry, it may be hard to realize how crucial catalysts are in today's world. (For those who have forgotten, catalysts are substances that increase the rate of chemical reactions without themselves undergoing a chemical change.) In fact, catalytic converters, which convert carbon monoxide (a poison) into harmless carbon dioxide, are required in all modern gasoline-powered automobiles. And catalysts are essential in virtually all the major industrial chemical processes upon which modern society depends.

Take gasoline, for instance. Every stage of petroleum-refining depends upon catalysts. "Everything that you put into your tank has gone over a catalyst," says Wayne. Catalysis is becoming even more important now that the easy way to increase octane — adding lead — is being phased out. "We now have to raise octane in a different way, by catalytic processing," says Wayne. The processing increases the number of branches on chains of hydrocarbon molecules, making them more readily susceptible to combustion.

And, says Wayne, all precursors to
(Continued on Page Six)



MICROCATALYTIC/SURFACE ANALYSIS apparatus behind Wayne Goodman and Chuck Peden (both 1134) allowed them and others on the research team to make some major advances in understanding catalysis at the molecular level, an understanding that the team has shown can be extrapolated to the "real world" of commercial catalysis.



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TONIMARIE STRONACH (3160A) has been named "Big Sister of the Year" for 1986 by Big Brothers/Big Sisters of Albuquerque. Christy Sanford has been her "Little Sister" since October 1982. See Page Seven.

Antojitos

California Update Thanks to a visit from my San Diego-based daughters over the holidays, I was privileged to update my education in transient philosophy. I speak, of course, of the California bumper sticker stickers. (Although I may not agree with their philosophy, I will defend unto death their right to stick it.) Drawing upon Nietzschean analogues, black humor responses to earlier fads are currently in: A rash of BABY ON BOARD and CHILD IN CAR stickers (designed, no doubt, to make you select another target when you lose control of your vehicle) has led to BABY IN TRUNK and CHILD TIED TO AERIAL. After the mundane I'D RATHER BE SAILING (or FLYING or FISHING or whatever) came I'D RATHER YOU WERE SAILING and I'D RATHER BE SMASHING IMPERIALISM. After MY OTHER CAR IS A ROLL (sometimes seen on Rolls-Royces!) came MY OTHER CAR WENT UP MY NOSE (this is Southern California). After I [heart symbol] MY CAT came I [spade symbol] MY DOG and I [club symbol] BABY SEALS. (I'm waiting for a local version, equally tasteful, such as "STOP EAR POLLUTION: Teach a Texan to Talk.")

* * *

Hail & Fare Well, Hank Those of us in Information Services 3100 said goodbye last week to our director. It wasn't easy. Hank Willis has held the slot less than four years, but in that time he's impressed me and, I believe, most others in 3100. Hank's a gentleman in the original meaning of that word -- a gentle man. But he combines that gentleness and gentility with a dedication to doing the job -- and doing it well -- that has inspired us.

I suspect we're not alone in mourning Hank's move to retirement. After all, he's been around since 1949 -- he was hired after a Saturday afternoon chat with Bill Moffat, who was impressed enough that the two strolled over to Glenn Fowler's house (both lived in Base housing) and woke Glenn from a nap for another chat. A few days later the two offered Hank a job and, after a couple of months waiting for a Q clearance, Hank was loading weapons aboard B-29s for Field Test. (Believe that, Herb Pitts?) By the following year he was a supervisor in drafting, by 1961 a department manager in security. His meteoric rise then leveled off a bit. In fact, he held, I hear, more DM jobs than anyone else in the history of the Labs. So lots of you have had Hank as a manager, if not director.

Hank is one of the original good guys, and I'd say that even if he hadn't been the person who selected me to be LAB NEWS editor. I'm not really sure he did me a favor -- but I like the guy anyway. ●BH

* * *

Bien predica quien bien vive. (Spanish: The man who lives a good life gives the best sermons.)

Welcome to SNLL

Livermore

Rolanda Bailey (8022)
Mike Firreno (8024)
Saundra Lormand (8024)
Linda Luchetti (8354)
Mary Mandia (8022)
Barbara Moy (8022)
Kristy Sibert (8264)
Janet Vahlensieck (8022)

California

Helen Chen (8234)
Cleo Evans (8022)
Jo Ann Jacobson (8264)
Timothy Sa (8271)
Oliver Lu (8432)
Dolores Wackerly (8022)
Catherine Hagar (8022)
Stewart Wavell-Smith (8265)
Glenda Padilla (8272)
Ellen Ochoa (8355)
Patricia Brennan (8022)
James Wallace (8257)
Barbara Zaragoza (8022)

Connecticut

Richard Wheeler (8478)

New Jersey

Dean Buchenauer (8347)

Pennsylvania

John Weeks (8348)

Congratulations

Lee Hord (8313) and Lisa Fesmire, married in Nashville, Tenn., Dec. 21.

Susan and Steve (8272) Bunn, a son, David Hyatt Pittman, Dec. 16.

Wendy and Sam (8245) Paolucci, a son, Brian Alberico, Dec. 18.

Sympathy

To Edele Norman (8274) on the death of her infant son in Manteca, Dec. 19.



DECEMBER Livermore retirees were Ed Holbrook (8181), left, and Hank Lucas (8263).

Green Light on Reactions



"The year was 1932. The city was Berlin. Adolf Hitler had not yet come to power, and Leo Szilard, a Hungarian Jew who taught physics at U. Berlin, happened to read a novel. The novel was old stuff, even then -- an improbable romance entitled *The World Set Free*, written in 1913 by H.G. Wells. In the novel, scientists discovered how to make 'atomic bombs' -- the phrase was Wells' -- from an artificial radioactive element. Dropped from aircraft, the bombs destroyed most of the world's major cities in an imaginary future war. The tale planted

a thought in Szilard's fertile mind, although he did not take it seriously at first. 'I had not been working in nuclear physics up to that time,' he reminisced many years later. Szilard moved to London almost immediately following the Nazi takeover. In September 1933, only a year after reading *The World Set Free*, he was waiting for a traffic light to turn green at a London intersection when it occurred to him just how a nuclear chain reaction could take place. He soon realized that such a reaction would liberalize immense energy and that it would enable governments to make bombs. 'I knew it,' he wrote later, 'because I had read H.G. Wells.'"

Warren Wager in *Futurist*

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ASME MEMBERS from Sandia Livermore were among a group that toured the *USS Carl Vinson* in port at Alameda in December. This nuclear-powered aircraft carrier is the newest in the U.S. fleet. From left are Walter Bauer (8340), Carolyn Pura (8164 and chairman of the Mt. Diablo ASME section), Cook Story (8316), Mark Perra (8314), John Kraabel (8132), and Hilton DeSelm (ret.).

Riddle of Nutation Solved

There's a similarity between a baseball that curves when it's thrown and the unstable "nutational" motion of a spinning artillery shell descending vertically while suspended from a parachute system attached to its nose. And discovering that similarity has allowed a Livermore researcher to help solve a weapon test problem.

Ben Benedetti, supervisor of Solid Mechanics Division 8241, took on the task of determining why spinning 8-inch and 155-mm diameter artillery projectiles tend to slowly turn upside down — "nutate" — while descending from the proper nose-up position from altitudes as high as 60,000 feet.

"Nearly all our units nutated so that the nose pointed toward the ground during parachute descent," Ben explains. "When the spinning shell is upside down like that, it rubs on the parachute recovery system."

The rubbing slows the spinning shell so it usually nutates back to a nearly base-down configuration before ground impact, the position desirable for data recovery (see box). But some projectiles tilt so slowly toward the upside down position that they hit the ground sideways, often damaging them enough that data recovery is impaired.

The spinning shell tends to nutate to the nosedown position during descent because the projectile is dynamically unstable in the base-down configuration; that much was clear. What wasn't clear was that this unstable nutational motion is caused by the direction of the Magnus moment vector (named after Heinrich Magnus, who, in 1853, conducted the first experiments to determine the forces acting on a rotating cylinder).

After developing a projectile's equations of motions, which were programmed for computer solution by Juanita Mansfield (8233), Ben did numerical simulations to learn how various physical parameters affected a projectile's motions during parachute descent. The study allowed him to determine which physical parameters were most important to the problem. And that determination led in turn to a clearer understanding of the Magnus moment vector and how its direction influences the stability, or the nutational motion.

"There had been several attempts by other investigators to solve this problem, but the Magnus effect either was not included or was thought to be insignificant," notes Ben. "Consequently, their calculations showed that projectile motions were stable. That obviously did not agree with our experimental observations."

Ben then reasoned that unstable nutational motion occurs because the projectile's center of mass is forward of the center of pressure for the Magnus force. "So we simulated the addition of a small amount of ballast to the unit so that the center of mass was aft of the center of pressure," Ben explains. "And it worked — the base-down projectile position was always dynamically stable. That is, the projectile would always come down base-first during parachute descent."

Ben's predictions based on the theory were proven by conducting gun-firing tests



EXAMINING A TEST SHELL are Ben Benedetti (8241), left, and Danny Mitchell (8163). The pair recently solved the riddle of why a spinning shell descending on a parachute tends to nutate (turn upside down). This unit is atypical in that it has a spoiler disk attached to the nose to increase aerodynamic drag and slow the projectile so that it reaches only 30,000 feet instead of the maximum altitude of 70,000 feet.



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of ballasted projectiles at Tonopah. The first shell, with its center of mass aft, was completely stable during parachute descent and landed base-down at 100 feet per second. The control unit, with its center of mass forward of the center pressure for the Magnus force (the typical configuration), was unstable and nutated upside down, cutting itself loose from the parachute — and impacting nose first at excessive speeds.

A spinning shell is then similar to a baseball thrown with enough spin to curve over the plate. That is, both shell and ball

experience lateral forces caused by the Magnus effect.

Danny Mitchell (8163) worked with Ben in preparing for the field tests. Danny was responsible for all the test projectile hardware, calculations of projectile center of mass and mass moments of inertia, and coordination of many of the activities associated with the field tests. David Abrahams (8186), Lloyd Young (7173), and Sally Antonchuk (8182) also worked with Ben on the project.

Take a Trip with a Projectile

As far back as 1968, Sandia has been testing artillery-fired, parachute-recovered projectiles at Tonopah Test Range. The projectiles, fired almost vertically, attain altitudes of about 70,000 feet. While inside the gun tube, the shell can experience an axial acceleration of 16,000 g's. And as the shell exits the barrel, it's spinning at 17,000 rpm, thanks to the rifling inside the gun barrel. (A projectile is aerodynamically unstable unless it's spun to provide gyroscopic stability. If a shell is not spun, it acts much like a football thrown without a spin on it.)

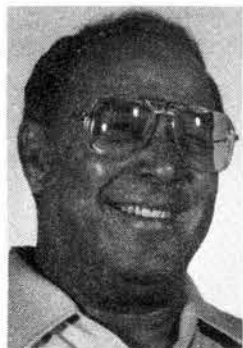
In addition to an on-board parachute recovery system mounted in the nose of the projectile, many test projectiles also carry telemetry systems that measure both the structural strain response of the shell to gun firing and the in-bore environments such as axial acceleration and base pressure.

The parachute recovery system is usually deployed shortly after projectile apogee. Since the shell is fired almost vertically, it is still nose up and spinning at 15,000 rpm when the nose-mounted parachute is deployed. The parachute provides a slow descent for the shell (which spins on a swivel bearing), so it impacts the ground at moderate speed.

The low velocity allows a projectile to survive ground impact well enough that designers can determine whether the gun launch or the free-flight environments caused any damage to various sub-assemblies and components. In addition, the telemetry system and projectile hardware can be re-used on subsequent tests.

Furthermore, it's important for structural reasons to assure that the projectile base, its strongest feature, always impacts the ground first. But, too often, it didn't. To explain why was Ben Benedetti's challenge (see related story).

Supervisory Appointments



ADAM TRUJILLO to supervisor of Field Support and Logistics Section 7135-1, effective Dec. 16.

Adam has been in his present organization since he joined the Labs in July 1953. He's had responsibilities for administrative and logistics support for the field test group most of that time. His duties have taken him to Bermuda (a three-year stint that was a highlight, he says) and Hawaii, plus other exotic places like the Las Vegas, Nev., airport, Mercury, and NTS. He's been at NTS since 1974.

He has taken a number of classes at the University of Nevada (Las Vegas) in computer science and mathematics.

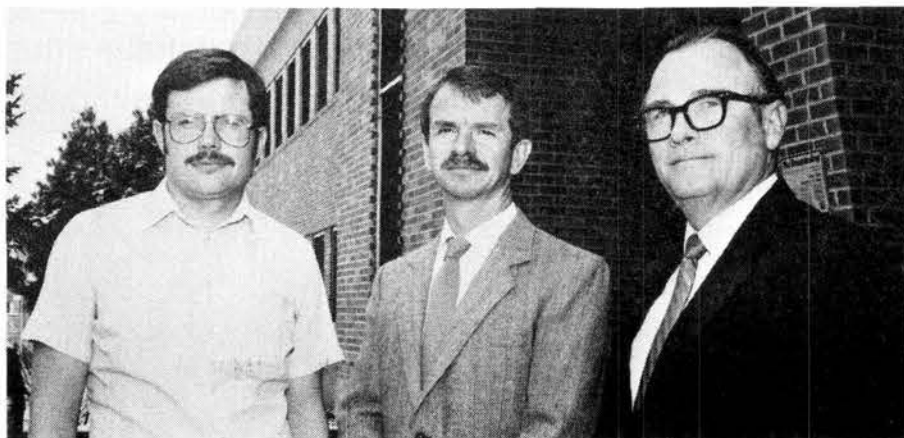
Adam spends a lot of his spare time on the golf course. He and his wife Tani live in Las Vegas. They have two grown children.

JIM FURAU to supervisor of Project Management Division 7866, effective Dec. 1.

Jim joined the Labs in December 1979 as an MTS in the pulsed power systems organization, where he had responsibility for mechanical systems project engineering for PBFA-I. In 1981 he moved to Pulsed Energy Projects Division 1201, which subsequently became the division he now supervises. Until his promotion, Jim was associate project manager for PBFA-II.

He has a BS in engineering science (mechanical engineering) from Montana College of Mining Science and Technology and an MS in civil engineering (structural) from UNM. He is a founder of the local chapter of the Project Management Institute and currently is the chapter's vice president for programs.

Jim enjoys handball and is the New Mexico State Commissioner for the U.S. Handball Association. He also skis (both downhill and water skiing). He and his wife Mary Lou have three children and live in the NE Heights.



JOHN WILLIAMS (5321), JIM FURAU (7866), and BOB WOOD (3724)

JOHN WILLIAMS to supervisor of Data Systems Division 5321, effective Dec. 16.

John joined Sandia in June 1978 as an MTS in the division he now supervises and has had project leader responsibilities for a number of activities.

He has a BS in applied mathematics from Northeastern Oklahoma State University and an MS in the same field from the University of Missouri — Rolla. He is a member of IEEE and the American Mathematical Society.

John is involved with several leadership responsibilities at his church and coaches youth soccer and basketball teams in his spare time. He and his wife Melina have two children and live in the NE Heights.

BOB WOOD to supervisor of Purchasing Division 3724, effective Dec. 16.

Bob joined the Labs in October 1980 as a purchasing consultant, specializing in purchasing instructions and internal review. He had worked in Air Force procurement before retiring from the Air Force in 1980 with the rank of Lt. Colonel.

He has a BS in commerce from the University of Iowa and an MA in procurement from Webster College. He is a Fellow in the National Contract Management Association and holds an NCMA Certified Professional Contract Manager certificate. Bob is head of the facilities committee for the 1986 NCMA Regional Education Symposium, to be held in Albuquerque in October.

Bob enjoys golf and gardening. He and

his wife Phyllis live in the NE Heights. They have two grown children.

STEVE DUPREE to supervisor of Systems Research Division II 312, effective Dec. 16.

Steve first joined Sandia in August 1975 as an MTS in the Theoretical Division, where he did work on Monte Carlo radiation transport. He left the Labs in 1980, but returned two years later as a member of Systems Research Division IV 314, the group he was in before his promotion.

He has a BS in physics from Rice University, and MS and PhD degrees in nuclear engineering from Texas A&M and Purdue University, respectively. He is a member of the American Physical Society.

Steve's spare time activities include woodworking, playing the piano, fishing, and camping. He and his wife Patricia have two children and live in the NE Heights.



STEVE DUPREE (312)

Events Calendar

Jan. 17-26 — "Master Harold . . . and the boys," New Mexico Repertory Theatre, 8 p.m. (Sat. and Sun. matinees at 2 p.m.), KiMo, 243-4500.

Jan. 17-18 — New Mexico Symphony Orchestra concert, all-Russian program (Glinka, Stravinsky, Tchaikovsky); Roger Melone, conductor; Lydia Artymiw, piano; 8:15 p.m., Popejoy Hall, 842-8565.

Jan. 17-Feb. 1 — "Vanities," Flashpoint Theatre Co., 8 p.m. Fri. and Sat., 6 p.m. Sun., Nuestro Teatro (3211 Central NE), 256-3114.

Jan. 19 — Harpsichord recital by Colleen Sheinberg (to benefit UNM Music Dept.), 4 p.m., Keller Hall, 277-4402.

Jan. 19 — Concert for the Albuquerque public (free), Albuquerque Municipal Band (Bennett, Reed, Host, Souza), 7 p.m., KiMo.

Jan. 20 — Showtime at the KiMo, Stringtime Series: Dave Van Ronk, blues and ragtime guitar; 8 p.m., KiMo.

Jan. 22-23 — Annual San Ildefonso Feast Day; procession in farolito-lit plaza on Jan. 22; daybreak animal dances in all four plazas, Buffalo, Comanche, and Deer dances on Jan. 23; 455-2273.

Jan. 24-Feb. 9 — "Foxfire;" Tues.-Fri. 8 p.m., Sat. 6 p.m. and 9 p.m., Sun. 2 p.m.; Albuquerque Little Theatre, 242-4750.

Jan. 24-Feb. 2 — "Top of the Charts," a musical review of Top 40 tunes from the 1950s and 1960s; Jan. 24-25 & 31, Feb. 1, 7-8 at 8:15 p.m.; Feb. 2 at 2:15 p.m.; 2nd Story Arts Center, Albuquerque Little Theatre, 242-4750.

Jan. 25 — Jaycee Track Meet, 7 p.m., Tingley Coliseum, 883-4040.

Jan. 25-26 — "Rapunzel," a new version of the classic fairy tale by the Albuquerque

Children's Theatre, 1:30 and 3:30 p.m. both days, Popejoy Hall, 888-3644.

Jan. 26 — "Myth and Mirth," New Mexico Symphony Orchestra Sinfonietta series; featuring Roger Melone, conductor, and the NMSO chorus; 3 p.m., First United Methodist Church, 4th and Lead SW, 842-8565.

Jan. 26 — Film, "Smoky Mountain Magic," presented by Richard Kern; Nature & Wildlife Film Series sponsored by the Central New Mexico Audubon Society, 7:30 p.m., Popejoy Hall.

Jan. 26 — Movietime at the KiMo — Love to Laugh Series: "The Mad Adventures of Rabbi Jacob," French (1974), English subtitles, 7 p.m., KiMo.

Jan. 31 — "Coppelia," Southwest Ballet Company and New Mexico Symphony Orchestra, 8:15 p.m., Popejoy Hall, 294-1423.

First Show of the Pebble, by the Pebble, for the Pebble

The First Annual Mineral Spirits Show is under way in the southeast corner of Bldg. 830, home of the graphic design crowd. The show displays the best in rock art.

Show curators Janet Jenkins, Jim Walston, Fay Ganzerla, and Jan Gaunce (all 3155) report the rock show got off the ground when curator Jenkins found one of her arty rock efforts, "This Is Not a Potatoe," in a desk drawer. Other rock art classics began coming out of the woodwork ... and other desk drawers. Scrap pedestals were grabbed off windowsills for use as display platforms, and the First Annual Mineral Spirits Show was born.

Show entries from all over the Labs appeared. "We're breaking down barriers among Sandia organizations right and left," curator Jenkins proudly points out. "Tech writers, custodians, crafts people, tech artists, secretaries, forms designers, video producers, and management have joined ranks to make this a wonderfully diverse show. We welcome other show entries; in the true EO spirit, we don't discriminate because of age, sex, ethnic origin, religion, or organization number."

Would-be entrants should not delay though, because Judgment Day is Jan. 24 — a week from today. That's the day STONY Awards will go to the "top rocks." Competition is rough; more than 60 entries are already on display. "New competitors are welcome. They are fortunate indeed; originally, Judgment Day was set for Jan. 10. However, because of this great LAB NEWS coverage — and again in the EO spirit, we decided to postpone Judgment Day until the 24th," says curator Gaunce. "However, please remind entrants we don't accept boulders."

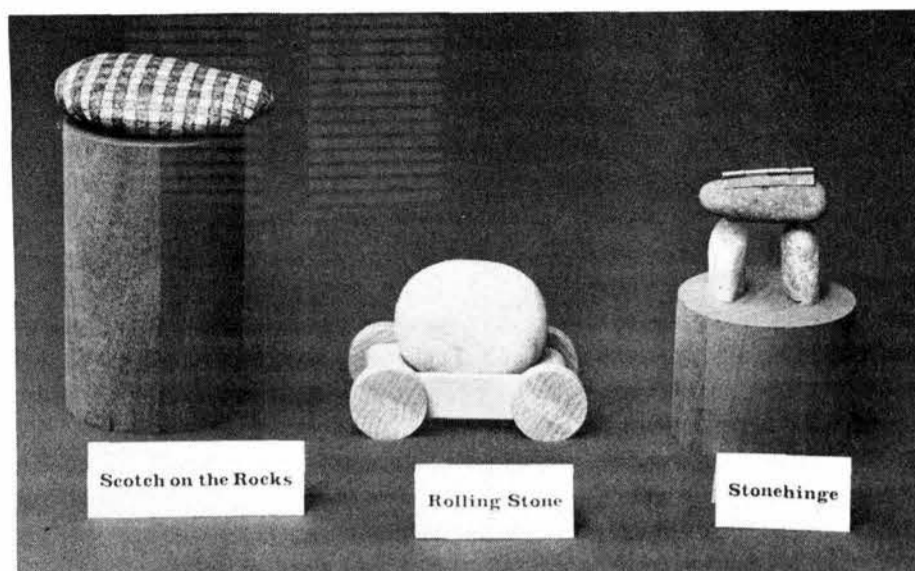
Excited curator Ganzerla adds, "We're riding a 'new wave' of artistic challenge with this show. Never in the history of the Labs have we seen more imagination and originality displayed."

You may want to see the show while it is displayed in Bldg. 830, since efforts to take it on the road have thus far failed (as have Plant Engineering's efforts to gravel a road with it). "We haven't been approached as yet about moving the show to the 802 lobby," says Jenkins, "but we're exploring the possibility of display space in the library — or perhaps at the Roxy."

Space prohibits LAB NEWS from publishing the names of all entries appearing in the show. Some of the more thought-provoking titles: "Goldie Rocks & the 3 Bayers," "Clock Around the Rock," "Stonehinge," "Rock of Ages, Cleft by Lee," and "Rock Hudson."

"I'm not stonewalling when I say this," curator Walston exclaims. "Outside of Lobo basketball, this is the best show in Albuquerque!"

LAB NEWS' resident art critic Phyl Wilson agrees: "It's a most prorocative exhibit, leaving no stone unturned in its attempt to elevate the human spirit — with a forklift, if necessary. There are no clinkers here, though some works are a bit boulder than others."



THESE OBJETS D'ART are just a few of more than 60 entries now on display at the First Annual Mineral Spirits Show in Bldg. 830. You're invited to enter your own pet rock, but hurry — Judgment Day is a week from today.

Fun & Games

X-C Skiing — If you're looking for some company out on those cross-country ski trails, you should check out membership in the NM Ski Touring Club. Club members get together for one-day trips, overnights, and a bus trip or two throughout the winter. The group meets the second Thursday of each month at St. John's United Methodist Church, 2633 California St. NE; next meeting is Feb. 13.

Downhill Skiing — For a \$15 donation, the American Lung Association and KOB radio are again offering a Ski Privilege Card this winter. It's good for a free lift ticket at five New Mexico ski areas: Angel Fire, Red River, Sugarite, Cloudcroft, and Rio Costilla. All the money collected goes to help the Association's fight for clean air and healthy lungs. Call 265-0732 for more info.

Archery — If you're looking for a place to practice your archery skills, look no more. The Manzano Archery Club has a practice range and a field range; both have numerous marked distances. Club membership info available from Kerry Lamppa, 299-1119, or Dewey Reed, 265-2687.

More Downhill — The New Mexico Multiple Sclerosis Society's annual Ski Extravaganza, a pledged event with prizes in all categories and a trip to some exotic place (last year it was Jamaica) for the top fund raiser, will be held at four New Mexico ski areas this year: Red River, Feb. 15; Sandia Peak, Feb. 22; Santa Fe, March 1; and Angel Fire, March 8. Participants line up sponsors for the events in which they are competing. Call the MS Society at 888-4948 for an info brochure and registration form.

Bike Racing — Here's your chance to get in on the big bike race challenge Sandia has issued to LANL as part of the "lab vs. lab" competition. Men and women racers are needed in all age categories for the races, to be held in late spring or early summer (one in Albuquerque, one in Los Alamos). Potential competitors, organizers, or cheerers-on should contact Neil Davie (7541), 4-6431.

Square Dancing — The Ponderosa Promenaders are sponsoring a series of

free square dancing lessons for beginners on Friday nights from now through the end of March. The dance sessions are at St. Luke's Lutheran Church, 9100 Menaul NE (just west of Eubank), starting at 7:30 p.m. Give Bob Luikens (5126) a call at 881-1382 for more info.

Bird Watching — If you can't tell a robin from a clay pigeon, here's your chance to learn all about the birds that winter at Bosque del Apache National Wildlife Refuge, one of New Mexico's finest treasures. Instructor Charles Hundertmark, president of Rio Grande Bird Research and a past president of the Central New Mexico Audubon Society, will present a course on "Winter Birds of Bosque del Apache" beginning Jan. 20. The SERP-sponsored class includes four classroom sessions (Jan. 20, 22, 27 and 29) from 7-9 p.m. in Rm. B5 at the Coronado Club and one all-day field trip to Bosque del Apache on Feb. 2. Course cost of \$25 covers classroom sessions and field trip transportation. Your check should be made out to Chuck Hundertmark and mailed to the SERP office at the C-Club.

Bowling — "Bowl for Kids' Sake," a pledged event to benefit Big Brothers/Big Sisters of America, comes up on Feb. 15 from 1:30-5 p.m. at Leisure Bowl, 7400 Lomas NE. Get your friends and family to sponsor you in a bowling game by pledging a certain amount per pin; for example, a pledge of five cents per pin means a contribution of \$5 to BB/BS if you bowl 100. Money raised locally goes to Big Brothers/Big Sisters of Albuquerque. Top bowlers receive prizes (trip to Las Vegas, VCR, or portable TV) donated by sponsors KOB-AM radio, America West Airlines, and Miller High Life. Call 881-2266 for pledge forms and more information.

Squash — The Albuquerque Squash Racquets Association will sponsor its third annual D/Novice Squash Tournament Jan. 24-26 at the Tennis Club of Albuquerque. Honcho Dave McTigue (1511) encourages first-time, rusty, and active players to participate. Give Dave a call at 256-1752 for more info.

Bimetallic Catalysts

plastics and virtually all other commodity chemicals — almost every household product the consumer is likely to use — are produced by passing chemicals over catalysts.

So it's easy to see why new knowledge that could lead to even small gains in the effectiveness of key chemical reactions could make economically significant increases in productivity.

"Many of these processes are so important that if you can improve them by even one-tenth of one percent it would be tremendously significant," says Wayne.

Among the key goals are to find ways to enable chemical reactions to occur at lower temperatures (so less energy is required to bring them about) and to increase the selectivity of the catalysts (so that only the desired reaction takes place). "If you don't have a fundamental understanding at the molecular level," says Wayne, "these goals are very difficult to achieve."

To gain that understanding, scientists need to identify which of the many variables involved in catalysis are the ones really responsible for the chemical reaction's proceeding as it does. "We're trying to simplify the problem," says Wayne. "We're starting to isolate the specific parameters that are essential. We need to be able to say, 'This is what's important for this reaction.'"

And that brings us back to bimetallic catalysts. Catalysts composed of not one but two metals have generated increasing interest in recent years. They allow chemists to tailor the catalysts' composition, and this tailoring enables increased control of catalytic activity and selectivity.

They have become commercially successful because they work, but chemists and chemical engineers really don't understand why, Wayne says. "So they have few ideas of how to make further improvements. What is it about two metals in combination that makes them a more effective catalyst than either alone?"

To study this problem the Sandia researchers chose the bimetallic catalyst copper and ruthenium. This is not in itself a commercially important catalyst, but it is a kind of prototypical bimetallic system; it serves as a fairly easy-to-study model of bimetallic catalysts in general. It is to researchers in catalytic chemistry what the *Drosophila* fruit fly is to geneticists.

Scientists already knew that this classical system had different catalytic properties from either copper or ruthenium alone. "It doesn't look or behave like either copper or ruthenium," says Wayne.

Chuck, Jack, Dianna, and Wayne used a special apparatus, the Sandia microcatalytic/surface analysis apparatus, to prepare and study the copper-ruthenium system. This laboratory instrument combines a high-pressure microcatalytic reactor with an ultrahigh-vacuum analysis chamber (see box). In this way the surface under investigation can be not only exposed to the reactants at normal (high) pressures

Modeling Real-World Catalysis in the Lab

In five years of research at Sandia and another five at the National Bureau of Standards, Wayne Goodman and his respective colleagues have made some notable advances in understanding catalysis at the molecular level.

They helped develop a new technique that allows the catalytic surface under investigation to be exposed to reactants at normal high temperatures and pressures but also to be examined under ultrahigh vacuum conditions. In the vacuum chamber part of this microcatalytic/surface analysis apparatus, the surface of a single crystal of the catalytic material is then probed by a host of modern surface analytic tools. These enable the investigators to characterize precisely the atomic details of the near-surface region. That ability in turn makes it possible to study molecular adsorption and reaction on a microscopic level.

Using these techniques, Wayne and his colleagues conducted a successful benchmark study of the kinetics of methanation. (Methanation is the production of methane gas by combining hydrogen and carbon monoxide in the presence of a catalyst.) This study demonstrated that the kinetics of the methanation reaction over *single crystals* of nickel or ruthenium (an idealized material best suited for study in the laboratory) were the same as the kinetics of the reaction using large-surface-area catalysts used in industrial processes.

These results established the practicability of modeling "real" catalytic reactions using well-defined, single crystals of the metal catalysts. This ensures that such studies are directly ap-

and temperatures but also examined under ultrahigh-vacuum (and therefore very controlled) conditions using a variety of surface-science analytical tools. The apparatus has metal-deposition capabilities that can be used to produce very thin and pure layers of one material on another.

The scientists began with a single crystal of ruthenium and evaporated onto it a single atomic layer of copper. They then used the analytic techniques to observe the new material's properties. Additional layers of copper could be added on and observed as well. All this can be done with atomic-layer resolution — a layer a single atom thick can be deposited and analyzed.

The analysis shows that the copper atoms sit in registry with the ruthenium atoms — they sit in the hollows between the ruthenium atoms (see drawing).

But because the atoms of ruthenium (atomic number 44) are slightly larger than the atoms of copper (atomic number 29), the array of copper atoms has to stretch by about 5 percent to maintain its fit with the array of ruthenium atoms. The copper becomes a "strained" lattice — the bonds between its atoms are longer than ordinary. This means it will have properties different from those of pure copper.

The new material doesn't look copperlike at all. Many of its properties, in-

cluding its reactivity, are different. "It's something that doesn't look like any known material," says Wayne.

The Sandia discovery of a strained-layer effect in catalysis is reminiscent of Sandia's discoveries and research on strained-layer superlattices in electronic materials. In fact, Fred Vook, director of Solid State Sciences 1100, had suggested several years ago that strained-layer catalysts could have interesting properties.

The researchers recently summarized their conclusions in a report on their discoveries: "These results demonstrate that significant structural perturbations of copper occur at the copper/ruthenium interface and that these changes lead to large effects on the chemistry of the altered copper. Such chemical effects are certain to play a role in the enhanced catalytic properties of copper/ruthenium bimetallic catalysts."

Adds Wayne: "And then there are the effects of electron exchange. It's difficult to say at this point which of these altered properties is more important."

But these structural perturbations may not be the only contributor to the increased catalytic function of the two-element catalyst. The experimental studies also indicate that there is some electronic transfer between the copper atoms and the

Commitment Pays Off**Sandian "Big Sister of the Year"**

Last month Tonimarie Stronach (3160A) received what she calls her "best Christmas present ever" when she learned that she had been named "Big Sister of the Year" for 1986 by Big Brothers/Big Sisters of Albuquerque.

Tonimarie's involvement in the BB/BS program is "a real love story," in her words. "Home is where the heart is," she says, "and I have found my home in this organization." She joined the program in 1982, and learned early on that BB/BS is unique in that its success depends totally on the commitment and dedication of adult volunteers.

Big Brother/Big Sister, a non-profit United Way agency, is funded by UW, state and federal grants, and private contributions. It recruits, screens, and trains adult volunteers who are matched with single-parent youngsters ages 6-18 on a one-to-one basis. Adult volunteers agree to spend at least three hours a week with their little brothers or sisters.

Children in the program have been deprived of the companionship of a mother or father through no fault of their own. "A death, divorce, desertion, or incarceration of a parent may have caused the separation," says Tonimarie. "Big Brothers and Big Sisters step in to fill the void left by missing parents."

Though some children referred to BB/BS have delinquency problems, she says most of the referrals are shy, lonely, or unhappy boys and girls who need the company of a caring adult on a consistent basis.

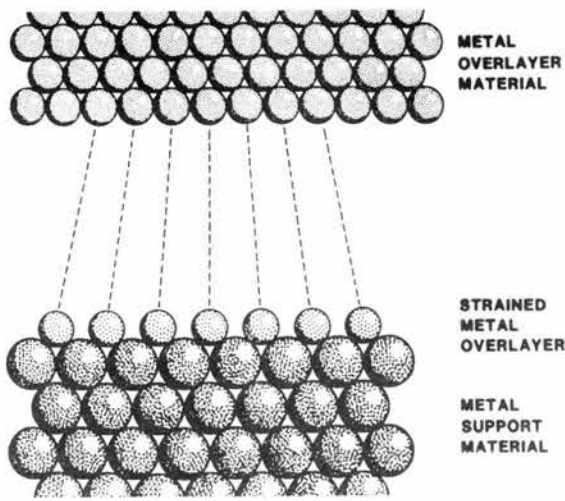
Tonimarie has been matched with 13-year-old Christy Sanford since October 1982. They spend a great deal of time together — most weekends, an occasional outing during the week, and phone calls in between. "I've seen Christy grow in many ways during these three years," says Tonimarie. "She has a reserve and self-confidence unique for her age, and I hope I'm part of the reason for that."

"Christy's also learning about taking on responsibilities. She has a regular set of chores at my house each Saturday (for which I pay her a small allowance) and helps out with some of my Big Brother/Big Sister jobs like the newsletter." (Tonimarie edits and publishes the BB/BS newsletter on a regular basis, and is working on a videotape to introduce the program to prospective adult volunteers.)

Tonimarie's commitment to her relationship with Christy isn't just time. She's seen that Christy has new clothes from time to time, and bought her a 10-speed bike a while back. ("I ate yogurt for two months to save for that bike.") And next summer the two are planning a trip to California to visit, among other places, the San Diego Zoo, including a tour of its animal hospital and clinic run by zoo veterinarians. "Christy says she's always wanted to be a vet, so this will give her a first-hand look at that kind of work," says Tonimarie.

In her quiet way, Tonimarie makes it clear that she feels greatly rewarded by her Big Sister involvement. "I invest a lot of time and a little money in my Big Sister role, but I get much more back than I put in. I can honestly say I'm happier now than I've ever been in my life. That's a reward you can't buy. And her [Christy's] success as a person is the biggest reward of all."

Madalyn Otero, a case worker at Big Brothers/Big Sisters, says the Big Sister of the Year selection is based on the quality and length of a Big Sister/Little Sister "match," as well as the amount of progress made in the relationship. Community involvement by the adult volunteer is also a factor in the selection process. "Christy has made terrific progress in the three years that Tonimarie has been her Big Sister," says Madalyn, "and Tonimarie has helped the program in all kinds of other ways, including the newsletter and video production. We feel she truly deserves this honor."



TWO METALLIC CATALYSTS attempt to fit each other, causing strains on one that give a bimetallic catalyst new properties not seen in either metal alone.

Continued from Preceding Page

Catalysts

ruthenium atoms below them. This electronic modification of the copper by the ruthenium affects the copper's properties and appears to be significant, according to recent calculations by Peter Feibelman (1151).

The studies are continuing in an effort to identify the exact ways these structural and electronic perturbations increase catalytic effects.

"We've shown that the problem is actually manageable," says Wayne. "We can now start talking about some very specific experiments to learn the precise answers. The potential is enormous. We are in a position to really capitalize on a new understanding."

The possible significance is considerable. "A general understanding of these interactive effects," Wayne and co-workers conclude in the report, "should result in highly specialized materials with superior surface properties."

Sandia's research in chemical kinetics and catalysis is funded by the Division of Chemical Sciences, and the structural and electronic surface physics research is funded by the Division of Materials Sciences of DOE's Basic Energy Sciences office.



Here are some current volunteer opportunities for employees, retirees, and family members. If you would like more information, call Karen Shane (4-3268).

NEW MEXICO MUSEUM OF NATURAL HISTORY needs docents to assist students at its Naturalist Center on weekdays or weekends.

REHOBOTH CHRISTIAN SCHOOL on the Navajo Reservation in western New Mexico needs science fair judges on Saturday, Feb. 15.

UNITED WAY OF GREATER ALBUQUERQUE needs a volunteer to help with phone verification of its Directory of Community Services. Person is needed 8 hours/week at downtown UW office.



YOSEMITE PHOTOGRAPHS on display in the Bldg. 802 lobby through February were taken by this quartet during a (privately paid-for) weeklong seminar run by the Sierra Photographic Work Center last spring. Seminar leaders, who worked with Ansel Adams, provided intense instruction in advanced 35mm color techniques. From left, Jim Pennington (3155-2), Lynn Peters (then in Tech Art), Odessa West, and Don Papineau (both 3155-2).

Retiree Deaths

(October through December 1985)


Doomas Easton (69)	Oct. 13
Ibre Brazell (87)	Oct. 27
Clarence Gamble (80)	Oct. 28
James Holliday (73)	Nov. 5
Travis Bogue (94)	Nov. 7
Salvatore Mattina (69)	Nov. 8
Samuel Moore (66)	Nov. 8
Marfilio Contreras (63)	Nov. 12
Merritt Hummer (72)	Nov. 19
Herbert Plagge (66)	Nov. 20
Kenneth Schooley (69)	Nov. 21
Sybil Milligan (76)	Nov. 28
William Brown (66)	Dec. 1
John Silva, Jr. (70)	Dec. 12
Arthur Hill (82)	Dec. 17
Paul Jones (54)	Dec. 22
Esther Stevenson (74)	Dec. 23
Murr Graham (83)	Dec. 23
Anol Elliott (73)	Dec. 27

Sympathy

To Necah Furman (3160A) on the recent death of her father in an automobile accident in Texas.

To Jim (400) and Bette Bolton on the death of their infant son in Albuquerque, Jan. 1.

Windsurfer Physics

 "Drag at low speed comes mainly from friction due to the viscosity of the water. The friction force acts on the wetted surface of the board. The larger the wetted surface, the larger the friction drag. As board speed increases, the water surface becomes increasingly deformed, leading to waves, foam and spray. All these represent energy dissipation and cause increased drag beyond the basic friction drag. As years have gone by, no one has provided a successful theory for these effects so they could be directly calculated. Today they are all lumped together and called residuary drag and they are estimated through model tests in calibrated water tunnels called towing basins." Jim Drake, *Wind Surf*

John McKiernan (ret.) has been named a Fellow of the American Society of Mechanical Engineers (ASME). In his 34 years at Sandia, he worked on nuclear weapons systems, SNAP (space nuclear auxiliary power) systems, UMTRAP (Uranium Mill Tailings Remedial Action Program), and WIPP (Waste Isolation Pilot Plant). John was also active in ASME, serving on its Board of Governors and as a regional and a national vice-president.

The American Nuclear Society and the European Nuclear Society will hold an International Topical Meeting on "Operability of Nuclear Power Systems in Normal and Adverse Environments" on Sept. 29-Oct. 3 at the Clarion Four Seasons. Bill Snyder, Director of Nuclear Fuel Cycle Programs 6400, is general chairman of the event, which is sponsored by the Trinity Section of the ANS's Nuclear Reactor Safety Division. Call Bill's office for a flyer. Deadline for papers is March 15; more information from Lloyd Bonzon (6446).

The NM Chapter of the American Vacuum Society holds its 22nd annual symposium on April 28-May 1 at the Albuquerque Hilton. Deadline for paper abstracts is March 3; call Jay Fries at LANL (FTS 843-0076) for details. For info on the four-day program of short courses that accompanies the symposium, contact Ray Berg (2534).

Larry Anderson (2000) and Bob Gregory (2100) are among the "Friends of JPL" invited to gather at the Jet Propulsion Lab in Pasadena on Jan. 25 to watch as the Voyager spacecraft transmits its first pix of

Uranus to Earth. Several of Sandia's radiation-hardening experts in 2100 served as consultants on the Voyager project.

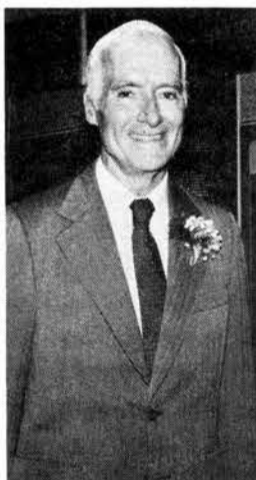
The APS Parent Center presents its third annual "Mini Conference for Parents" on Feb. 8 from 8:30 to 1 p.m. at Albuquerque High School (800 Odelia Rd NE). Keynote address, "Parents, Teachers, Managers — That's You," is by James Miller. Flyers listing the 26 seminars available (choose two) are in the LAB NEWS office.

Is New Mexico's most appreciated "office person" a Sandian? The Cystic Fibrosis Foundation (along with Cheers and Q-106 radio) is looking for same, and one of the winners (based, apparently, on the number of ballots cast) will be chosen — during the state's "largest office party" on Jan. 28 — for the grand prize: a hot air balloon ride, a one-week stay in a resort hotel, and a \$100 gift certificate from Sanger-Harris. Ballots are available in the LAB NEWS office.

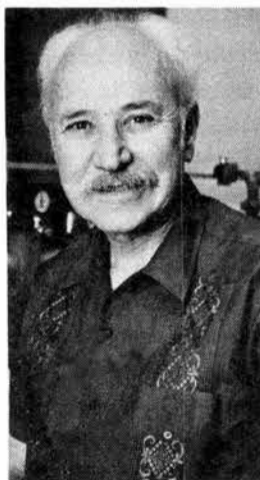
POKWA (Parents of Kids with Asthma) is a support group that helps parents learn more about asthma and develop skills in taking care of an asthmatic child. The group meets the third Monday of every other month. The next meeting, on Jan. 20, features Bruce Feldman, M.D., speaking on "Asthma—In General." More info from the Lung Association on 265-0732.

J.J. Brody, professor of art history, Southwestern Indian art historian, and former director of UNM's Maxwell Museum, will discuss the evolution of Pueblo Indian pottery during the 20th century — Jan. 23, 7:30 p.m., at the Museum; \$2.

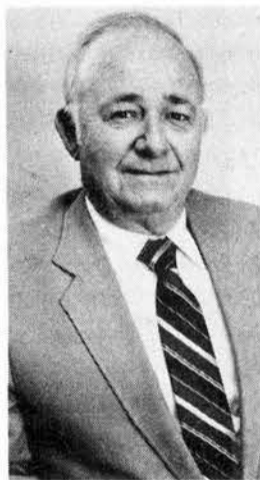
Retiring



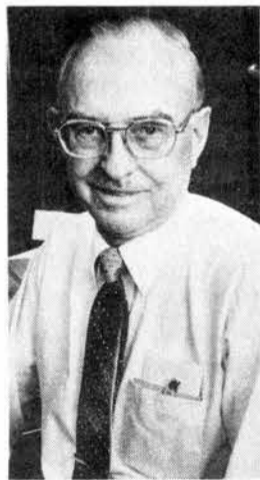
Hank Willis (3100) 36 yrs.



Bill McKinney (7242) 34 yrs.



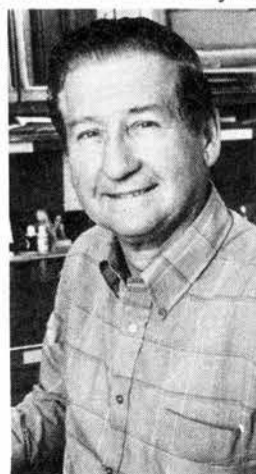
John Smelser (7225) 35 yrs.



Ray Cohrs (7862) 22 yrs.



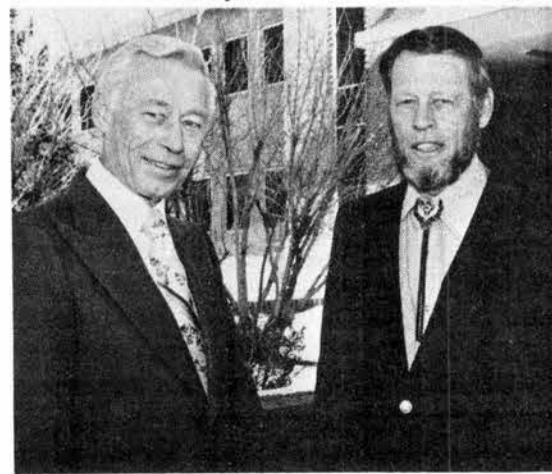
Glenn Prentice (5341), Leo Navoda (7535), and Russ Hall (2612) 33 yrs. 32 yrs. 33 yrs.



Dwayne Mozey (5213) 31 yrs.



Frank Casner (7242) 26 yrs.



Leslie West (5268) and Dick West (2362) 39 yrs. 35 yrs.

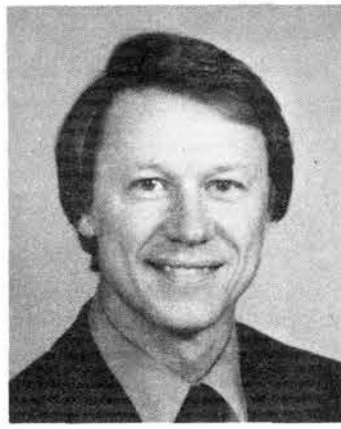


Ike Gutierrez (3426), Ted Varoz (3434), and Bruno Navalesi (141) 21 yrs. 35 yrs. 28 yrs.

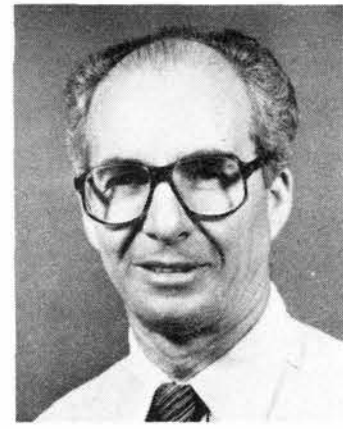
MILEPOSTS

LAB NEWS

JANUARY 1986



Rick Wayne (8400) 20



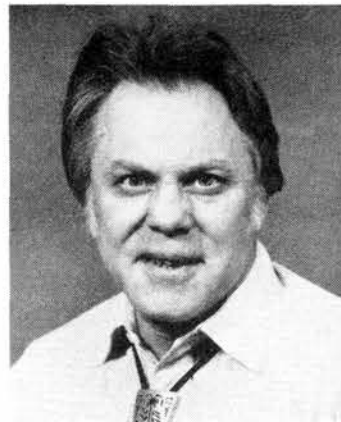
Al Farmer (2312) 30



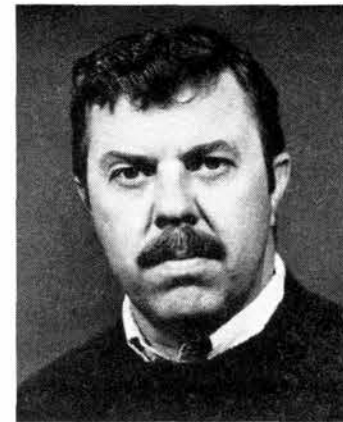
Chris Saavedra (7818) 10



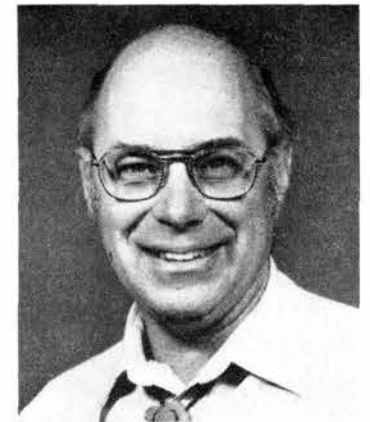
Norbert Molter (2858) 35



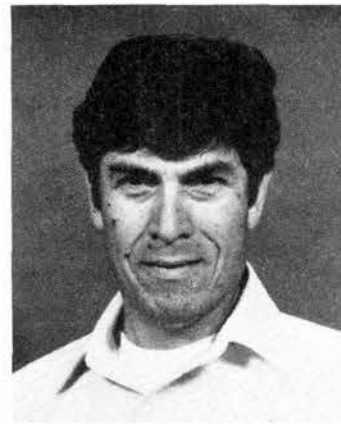
Ron Husa (2314) 25



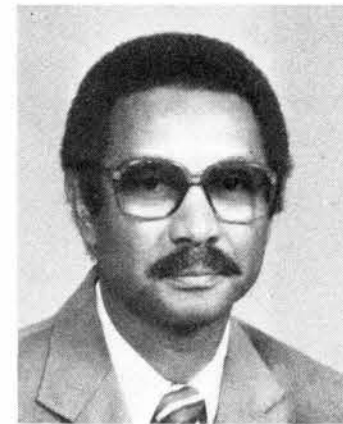
Fred Broell (2115) 10



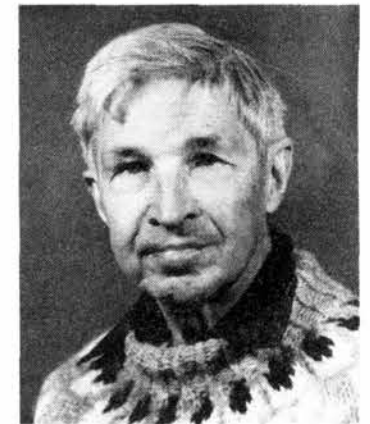
Will Ouellette (6422) 30



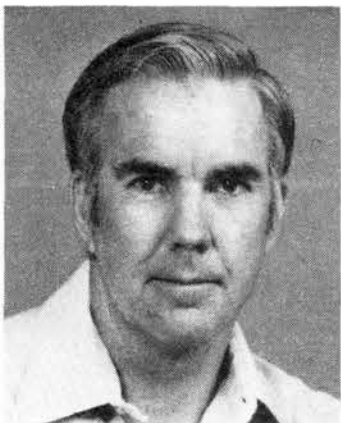
Rudy Jaramillo (2851) 10



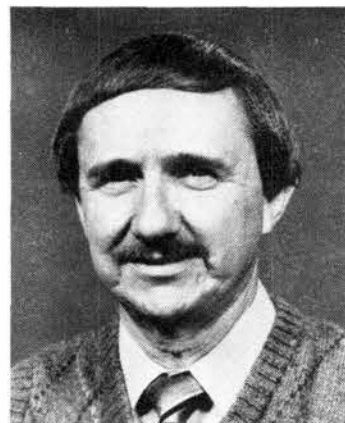
Bill Ormond (8263) 20



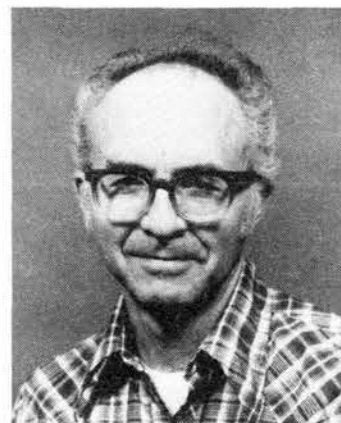
Tom Russell (2858) 10



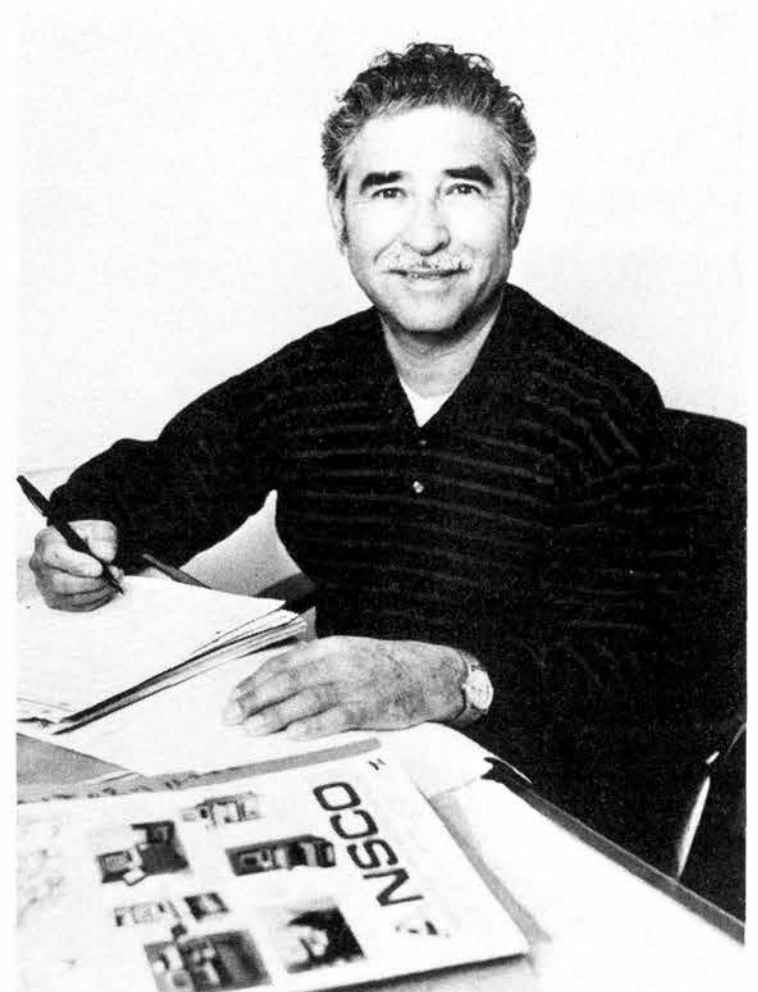
Al Baker (8471) 20



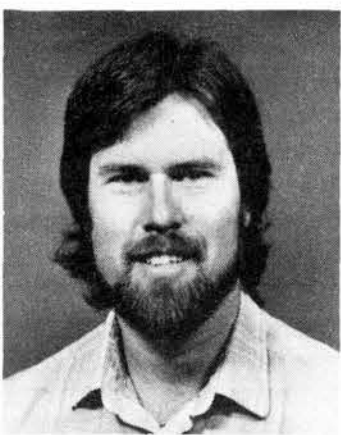
Otto Erdman (7843) 10



Bill Geck (3153) 25



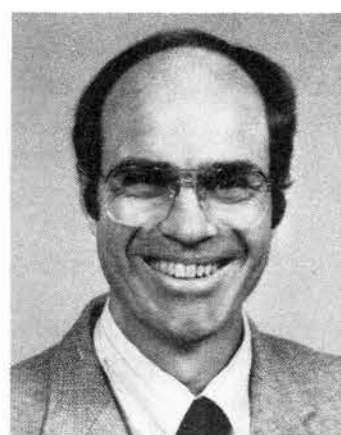
Johnny Chavez (3426) 30



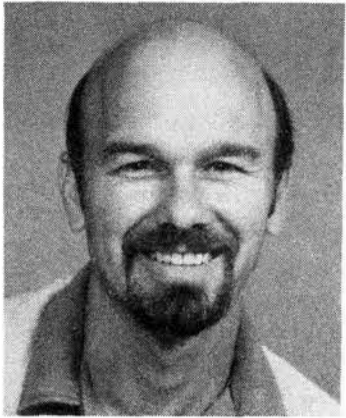
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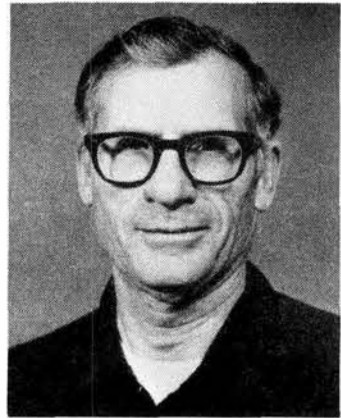
Russ Curtis (3427) 10



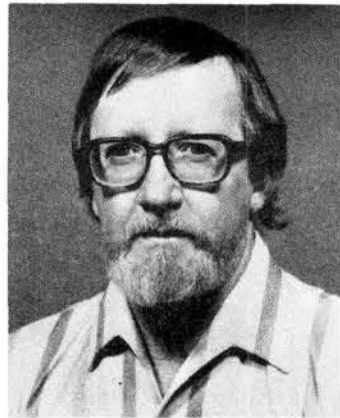
Charles Hartwig (8244) 15



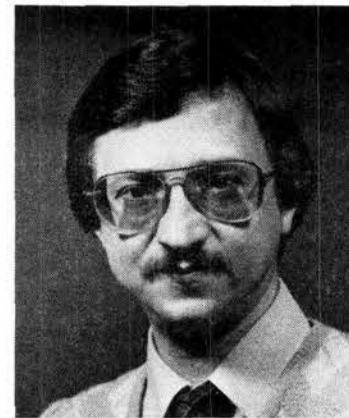
Art Hayes (8271) 15



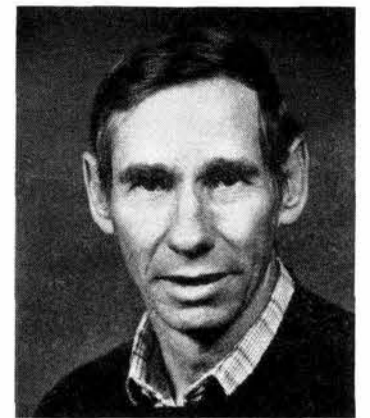
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Wes Pfarner (343) 25



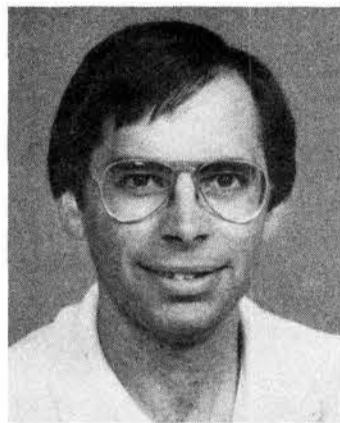
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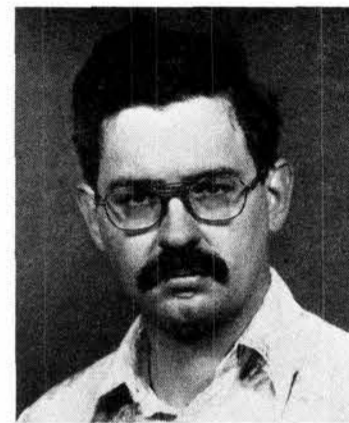
Carl Smith (7112) 10



Jeff Philbin (6452) 15



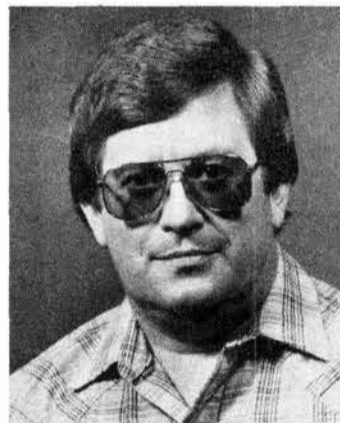
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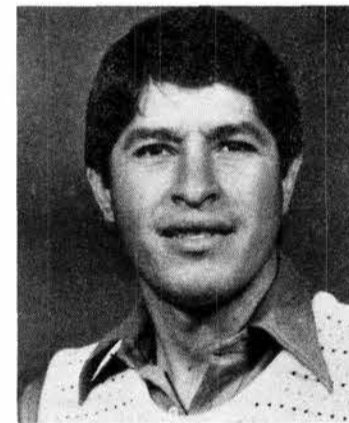
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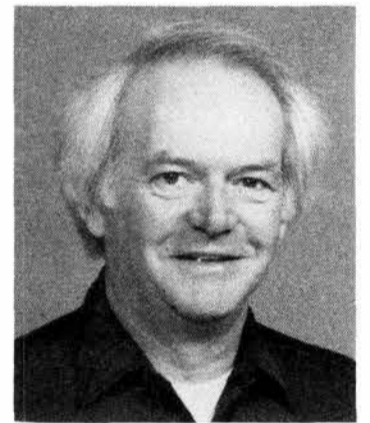
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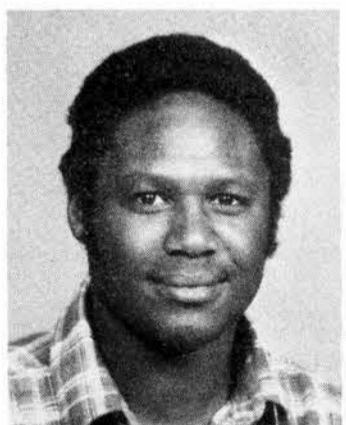
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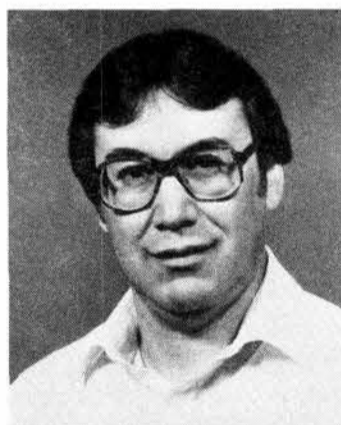
Wilfred Jaramillo (2149) 10



Bill Kent (8361) 20



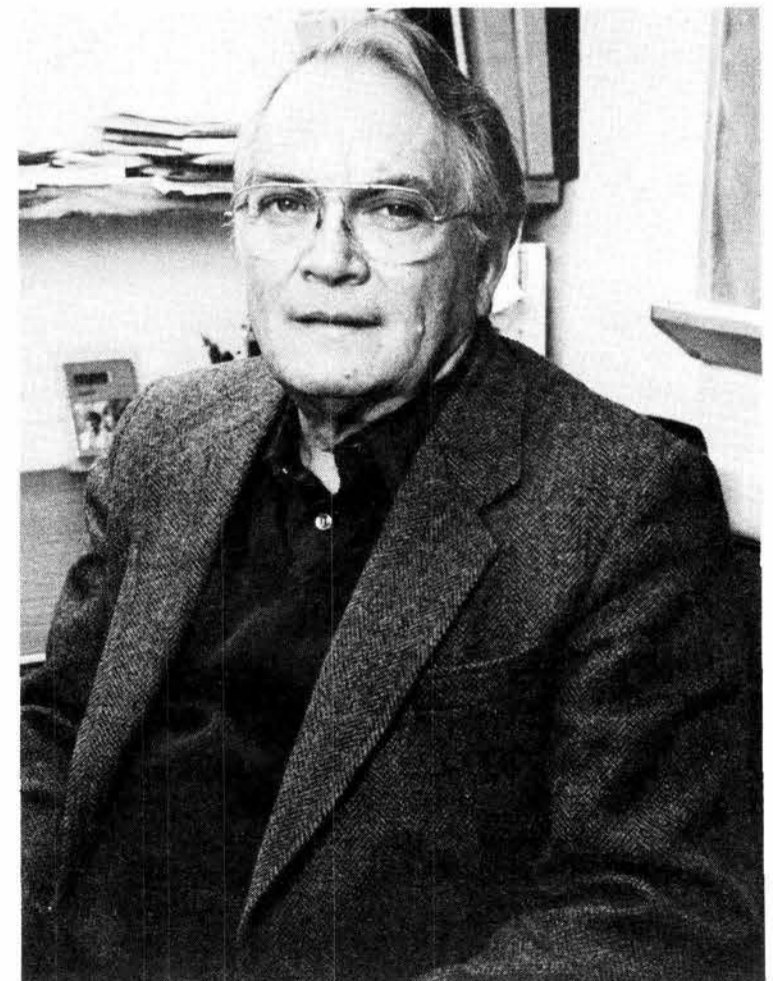
Jeff Moore (8262) 10



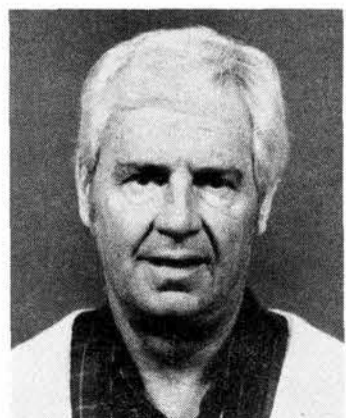
Joe Borrego (2564) 10



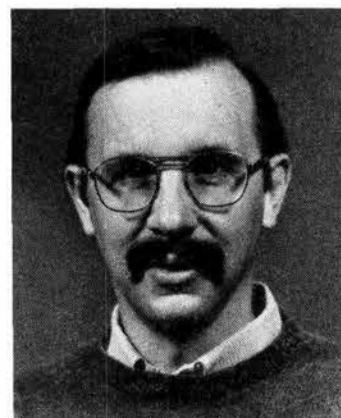
Mike Zapach (7251) 25



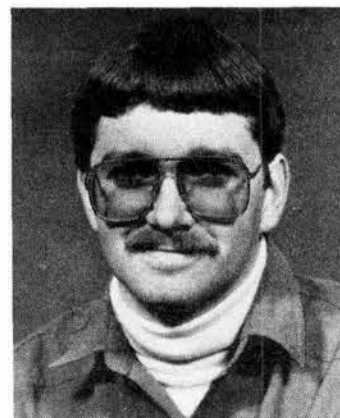
Cecil Land (1112) 30



Russ Brown (2566) 10



Greg Haseman (1824) 10



Terry Koontz (5343) 10

Welcome

Albuquerque

Robert Brown (3434)
Janet Cole (3463)
Mary Kay (2149)
Michael Malone (1811)
Gloria Martinez (3434)
Karen Robinson (6331)
Hazel Rodriguez (154)
Patricia Salisbury (3510)
Joel Stevenson (1841)
Cheryl Vigil (1263)

Arkansas

Mary Prickett (7251)

Illinois

John Hogan (3743)

Indiana

Paul Kaplan (6315)

Missouri

Robert Weir (1631)

New Mexico

Christine Abadie (141)

Mack Adams (2336)

James Deaguero (2313)

Charles Egbom (5145)

Gene Marquez (3434)

Kenneth Piorkowski (2336)

Tommy Serna (3434)

Tennessee

Stephen Fries (2533)

Texas

Mary Clark (2624)

UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS

Deadline: Friday noon before week of publication unless changed by holiday. Mail to: Div. 3162.

Ad Rules

1. Limit 20 words, including last name and home phone.
2. Include organization and full name with each ad submission.
3. Submit each ad in writing. No phone-ins.
4. Use 8½ by 11-inch paper.
5. Use separate sheet for each ad category.
6. Type or print ads legibly; use only accepted abbreviations.
7. One ad per issue per category.
8. No more than two insertions of same ad.
9. No "For Rent" ads except for employees on temporary assignments.
10. No commercial ads.
11. For active and retired Sandians and DOE employees only.
12. Housing listed for sale is available for occupancy without regard to race, creed, color, or national origin.

MISCELLANEOUS

WOOD CAST IRON HEATER, 40" high, 15" dia., 30" deep body, heats over 1500 sq. ft., \$400. Lopez, 265-3296.
GAS STOVE, \$25; dog house, \$10; chain link gates; tires, 195/70 HR14; bath lavatory. Padilla, 877-2116.
SKI RACK, locks onto many trunks or hatchbacks, holds four pairs of skis, "Barcreafters," with locks and keys, \$35. Barr, 821-5870.
CHEST FREEZER, 6 cu. ft., Sears, \$125; game table w/chairs, \$60; air hockey table, \$35. Brown, 293-4299.
SOFA AND LOVESEAT, rust color, \$100; coffee table, 1 end table, \$50; lamp w/pleated shade, \$15. Monaco, 294-2754.
SONY PORTABLE VCR Model SL-2000, tuner timer Unit TT-2000, video camera HVC-2400, 1 blank tape, all wiring, used once, all \$1600 firm. Kirson, 266-7674.
SEARS Best range hood, stainless steel, \$125. Barton, 268-7349.
BATTERY CHARGER, Sears, 4-amp, 6/12 volt, \$12. Schkade, 292-5126.
SKI BOOTS, Raichle, size 8, and skis, Equipe, 140 cm, \$30 each; transceiver, Swan 350D w/mike, \$180. Schowers, 822-8494.
BASSET HOUND PUPPIES, 3 male, ready after Jan. 20, \$200 each, w/papers. Hines, 294-0078.
SKIS, bindings, boots, Mark I, Spade-man, etc., children, adult; exercise cycle, \$45. Fisher, 881-8072.
MOBILE HOME, handyman special, partly furnished, some materials furnished, price slashed. Brockway, 247-9460.
ARABIAN PUREBRED MARES, trained: chestnut, 4 yrs., bay, 5 yrs., \$3000; 84 chestnut filly, halter broken, \$1500; all are Hindi bred. Hindi, 299-8996.
D-41 MARTIN GUITAR w/hard case, left-handed, \$1800. Perryman, 281-3020.
SHOWER TILE, used, free; 19" color

TV, not working but fixable, \$10. Van Deusen, 291-8196 after 6.
AKC SIBERIAN HUSKY PUPPIES, blue eyes, black and white, 4 weeks old, champion lines, \$200. Puccini, 255-0568.
S&W REVOLVER, Model 19, 357 mag., 2½" bar., Pachmayr grips, pancake holster, \$200. Parks, 884-7475.
BED KING FRAMES w/sheets, mattress cover clean, \$150; two ladder-back chairs, \$30; vanity dresser, \$40. Strance, 298-0258.
FREEZER, Sears Coldspot, 19 cu. ft., \$195; skylights, 2 ea., 2'x4', double insulated, new, \$40 each. Stevens, 293-5704.
14' WOLVERINE ALUMINUM BOAT and trailer, \$500; 6-hp engine, \$500. Cooper, 255-4725.
LOWREY ORGAN, 1982 Holiday, w/Magic Genie, Track III stereo, music, bench, below book, \$4200. Rauch, 821-6992.
FEMALE CAT, 2 years old, gray/white, declawed, has all shots, box trained, free to good home. Douglas, 281-9504.
YOUNG CHANG PIANO, 48" console w/bench, walnut satin finish new \$3600, asking \$2800. Jones, 293-0497.
WEIGHT BENCH, inclines w/leg curls, rope pulls, arm curl pad, and weights, \$50. Baney, 294-8970.
ELDORADO CAMPER SHELL, LWB, propane stove, icebox, sink and closets, asking \$600. Griego, 345-3268 after 6 weekdays, anytime on weekends.
LITTLE GIRL'S WHITE BEDROOM SUITE, one year old. Lovato, 897-2917.
TELEMARK CROSS-COUNTRY SKIS, waxable, 210 cm, Kazama Mountain Highs, Villom bindings, used five times, paid \$240, want \$110. Blake, 881-1663.
22-CAL., SEMIAUTOMATIC RIFLE, New Haven Model 251C, \$40. Murphy, 881-1520.
IBM PC, dual 360K drive, 640K RAM, keyboard, Amdek amber monitor, Hercules compatible board, 135 W supply, \$950. Chu, 298-1073.
WEDDING RING, never worn, wide gold band w/diamond solitaire, paid \$600, asking \$375. Garcia, 242-0659.
STEREO SPEAKERS (2), 6"x9", 100 watts, jet sound, new, both \$30. Marchi, 299-8516.
AM/FM STEREO RECEIVER, cassette recorder, turntable, 12x20 speaker enclosures, stereo headphone jacks, Soundesign, \$35. Holmes, 292-0898.
PANASONIC PV8500 VCR; PK450 camera cases; AC adapters; extra batteries, and more. Matthews, 869-2370.
HARDTOP FOR JEEP CJ-5, used once, original price over \$1300, want \$1000 OBO. Chavez, 243-9530.
TWO CENTER LINES, 8"x15", GM 5-hole, B.F. Goodrich radial T/As P295/50R 15, \$175 for both. Paulos, 247-4851.
LARGE 5-DRAWER CHESTS (2), \$50 the pair. Dellinger, 293-5149.
COMBINATION BUMPER POOL/POKER TABLE, \$125; kitchen table/chairs, \$100; color TV, console, Zenith, 25", \$75. Shipley, 298-2433.
BATH RUGS (3) w/lid cover, blue/navy, \$5. Robinson, 255-0114.
TYPEWRITER, Remington 713, \$140.

Young, 869-2162.
BLACK VINYL SWIVEL ROCKER w/ottoman, \$40. Smith, 299-6873.
MODEL 90 automatic zigzag sewing machine, all attachments, w/hand-made table, \$100. MacInnis, 898-1628.
COMPACT REFRIGERATOR, Montgomery Ward, brand new, \$125. Alsbrooks, 883-8114.
AJAY OCTA-GYM exercise unit (new); Don Carter "Ebonite" 8-lb. bowling ball (used). Hernandez, 843-7135.
METAL DETECTOR, Daytona II, discriminator, low battery drain, \$120. Fink, 292-8197.
BEER-MAKING OUTFIT, primary and secondary fermenter, airlock, bottles; fly-tying feathers. Stromberg, 255-6131.
REFRIGERATOR, \$75; gold chair/ottoman, \$100; box of power hammer nails, \$5. Falacy, 293-2517.
2 CONCERT TICKETS, Feb. 7, Itzhak Perlman (seats on stage), \$90; 2 symphony tickets, March 8, Row 24 orchestra, seats 3 and 4, \$30. Wolf, 293-2308.
SKI BOOTS, men's 9½, \$20; Samsonite padded folding chairs, \$10 each; twin innerspring mattress, \$10; hand-crank slicer, \$20. Horton, 883-7504.
LEAVING USA: Hotpoint washer/dryer, old color TV; radio; some furniture and household articles. Frid, 294-2654.
WATERBED, king-size, used one month, includes headboard w/mirror, mattress, heater, and liner, \$200 or reasonable offer. Orth, 292-6174 after 5:30.
REFRIGERATOR, 16 cu. ft., copper, icemaker, \$200; stove, electric, 27" drop-in, \$40; stove hood, 42" vented, copper, \$10. Schuster, 299-1072.
FLOODLIGHTS, 150-W, black cylindrical housings, \$5/each or \$75/19 units; gas water heater, 40-gal., \$25; BBQ grill, \$20; Kenmore washer/gas dryer, both \$90. Brandon, 836-5621.
TELESCOPE, Tasco, 60-mm lens, 800-mm F/L, two eyepieces, 2X Barlow lens, dia. prism, erecting prism, container. Miller, 268-5992.
BATHROOM FIXTURES, 47" cabinet, form cove top, sink, faucet, mirror w/medicine cabinet, 4-bulb light, \$190. Gardner, 293-8617.
NEW 1985, 19' KIT ROAD RANGER TRAVEL TRAILER, never used, self-contained. Thomas, 298-0961.
USED CASTLE GREYSKULL for He-Man Figures, \$15. Hall, 262-0084.
FREE, gray house cat, spayed and declawed, 5 years old. Case, 299-0923.
DELUXE ROPER RANGE, self-cleaning oven w/microwave oven, almond color, used 4 months, \$800. Palmer, 294-7656.
2-METER HAM RADIO, SANTEC ST-144, programmable, w/accessories: Mirage 2m amplifier, Bearcat 210 programmable scanner, PDL II 10-20m beam. Hobbs, 268-6461 after 5.
FENDER precision base guitar, Peavey amplifier, 400-W, \$600. Patton, 298-9987.
TWO TIRES AND WHEELS, 12x16.5 LT, 3/8" tread depth, 8-bolt wheel, 6½" dia. circle, \$130. Cunningham, 344-9841.
PORTABLE SPA, 6'x6', redwood deck, cover, 120-volt, 1 year old, will

deliver, \$1000; 8x8x16 cinder blocks, 40¢ ea.; unfinished knotty pine paneling. Kerschen, 292-8001.
CARPET AND PAD, 35 sq. yds., light blue nylon, used, \$50; bathtub, cast iron, white, tile included, \$50. Dippold, 821-5750.

TRANSPORTATION

LEAVING USA: '81 TOYOTA Corolla. Frid, 294-2654.
'64 PONTIAC Lemans, original owner, 326 engine, \$800. Linn, 296-3176.
'84 PONTIAC Fiero, AM/FM stereo/cassette, AC, luggage rack, 4-cyl., 4-spd., warranty, good gas mileage, \$8600. Johnson, 823-2253.
'76 FORD E250 van, V8, PB, PS, AC, XHD, AM/FM/cassette, new transmission, new brakes, \$2500 OBO. Martinez, 883-7308.
'79 FORD F250 camper special, 4WD, AC, PS, dual tanks, tinted glass, sunroof, camper shell, new radial tires, \$4000. Witt, 281-9455.
'77 DODGE van, 4 captain's chairs, carpeted interior, 3-spd., rebuilt engine, \$3000 OBO. Meyer, 821-0123.
'82 CHRYSLER LeBaron, 2.6cc engine, AC, AM/FM, PW, TW, P/locks, vinyl roof, new Michelin tires, 22K miles, \$6000. Jaramillo, 255-8288.
BICYCLE, boy's 16", Motocross style w/training wheels included, \$20. Koski, 822-1122.
BICYCLE, lady's 26", 10-spd. Schwinn including lock, cable, carrying case, bike seldom used, \$85. Hitchcock, 294-4591.
2 10-SPD. BICYCLES, 26" Columbia Chargers, \$75 each or both for \$140. Baney, 294-8970.
BICYCLE, 10-SPD., 24" Peugeot, good for younger or smaller riders, \$70. Church, 281-5215.
'76 OLDS Cutlass Supreme, \$1600. Pierce, 268-2122.
'74 FORD Maverick, 6-cyl., AT, PS. Padilla, 877-2116.
'80 PONTIAC Phoenix, 4-dr. HB, AT, PB, PS, AC, AM/FM cassette/stereo, power locks, \$2500. Holt, 294-6928.
'66 DODGE 383, 4-bbl.; '70 Maverick, 6-cyl., AT; '76 Bobcat, 4-cyl.; \$400 each. Breden, 292-0775.
'75 PLYMOUTH Duster, under 85K miles, AC, AT, \$875. Durham, 298-0733.
'77 RABBIT, new clutch, struts, brakes and tuneup, \$1200. Miller, 892-3262.
'83 S10 BLAZER, 4WD, AT, Tahoe pkg., power windows/locks, cruise, AC, AM/FM cassette, \$8100. Helgesen, 292-0770.
'63 STUDEBAKER pickup, ½-ton, short wide bed, \$1300. Fink, 292-8197.
10-SPD. Takara youth's bicycle, 24" wheels, \$65. Easterling, 298-7083.
'69 DODGE window van, rebuilt engine/transmission. Widner, 294-2014.
'72 PLYMOUTH, 9-passenger strn. wgn., 318, V8, new tires, original owner, \$600. Wolf, 294-7197.
RALEIGH SUPER COURSE 10-spd. bicycle, 23" frame, \$125. Haaker, 293-1077.
'72 VW Bug, new radials and paint, \$2300 OBO; '72 Datsun 240Z, good engine and transmission, \$2200 OBO. Trujillo, 884-4190

after 5.
'75 TOYOTA Corolla strn. wgn., 79K miles, AC, AM/FM/cassette, new windshield and upholstery, radials, \$2350. McTigue, 256-1752.
'83 JEEP CJ-7 Laredo, 7K miles, no off-road use, 5-spd., 6-cyl., hard-top, \$8750. Turner, 293-8938.
'64 LINCOLN Continental, 4-dr. sedan, \$850 firm. Cunningham, 344-9841.
'79 TOYOTA Corolla, 5-spd., AC, 2-dr., new Michelin X2X radials, AM/FM/cassette, 84K miles. Schlavin, 299-6592.

REAL ESTATE

'72 AMERICAN MOBILE HOME, 12'x65', 2-bdr., 1 bath, appliances/washer, covered porch, carport, A/C, awnings, storm windows, in adult park. Ridlon, 298-4729.
2-BDR., hardwood floors, kiva fireplace, den, updated kitchen, storage shed, San Mateo/Lomas area. Perea, 255-6447.
PRIVATE 3-BDR. HOME off S-14, Ponderosa Pines, community water, one acre, 3-car carport, garage, storage. Jacoby, 298-7119.
1.3 ACRES, El Pinar Estates, 14 miles east of city off frontage road, wooded, electricity, phone lines on property, \$8000. Perryman, 281-3020.
3-BDR. HOME, 1800 sq. ft. with garage, patio, pool, tennis, clubhouse, RV parking, lawn care included, available immediately. Cropp, 296-1877.
2-BDR. CONDO, NE location, single-car garage, fireplace, 1½ baths, cash-to-loan or refinance, \$58,500. Sanchez, 299-7086.
2-BDR., 1½ bath townhouse with lease option, \$600/mo., partly furnished, small yard, downtown area. Gronewald, 242-6072.
RIO RANCHO, Corrales Heights, 1800 sq. ft., 4-bdr. house, cul-de-sac, \$72,000. Brandon, 892-0449 or 836-5621.
4-BDR. HOUSE in New Holiday Park, 1960 sq. ft., alarm system, solar panels, many other extras, appointment only. Mehlhorn, 294-5685.
5-BDR. OLDER HOME close to Sandia, more space for less money, den, formal dining room, many extras. Stromberg, 255-6131.

WANTED

CAGE suitable for guinea pig; large terrarium. Rodacy, 293-2668.
BABY CRIB in good condition. Wright, 294-7250.
PRINTER, Apple Imagewriter or equivalent for use with Macintosh. Loucks, 281-9608.
50-MM MACRO LENS, screw mount for Pentax 35-mm camera. McDonald, 265-2842.
TO BUY: FRANCISCAN POTTERY "Madeira" pattern, dinner plates, soup bowls, etc. Lee, 821-5849.
GOREN'S GAME OF AUTOBRIDGE. Tanner, 881-1636 after 5.
DAYCARE for 7-yr.-old, second grader at Osuna Elementary before and after school. Hall, 262-0084.
BABY-SITTER in our home for 4-month-old, M-F 7:30 a.m.-5 p.m., references and experience required. Geer, 255-3201.

SHARE-A-RIDE

Rider wanted from Los Lunas. Otero, 865-9712.

Coronado Club Activities

Baron of Beef Reigns Tonight

THE FAMOUS BARON of Beef buffet is featured tonight at the Club for your dining pleasure at the low, low price of \$6.95. Afterward, work it all off by stompin' around to the country-western strains of that well-known group, the Isleta Poor Boys.

THUNDERBIRDS, if you've recovered from the dinner dance last Saturday night, here's another chance to get out among 'em. This Sunday, Jan. 21, meet your friends at the Club for a delicious brunch (served from 11 a.m. to 2 p.m.). The Bob Banks Trio will be on hand from 1-3 playing music for dancing (or relaxing). For you wistful folks out there who think you have to be a T-Bird and retired to get in on all this fun, it just ain't so. Any C-Club member is welcome at Thunderbird-sponsored events.

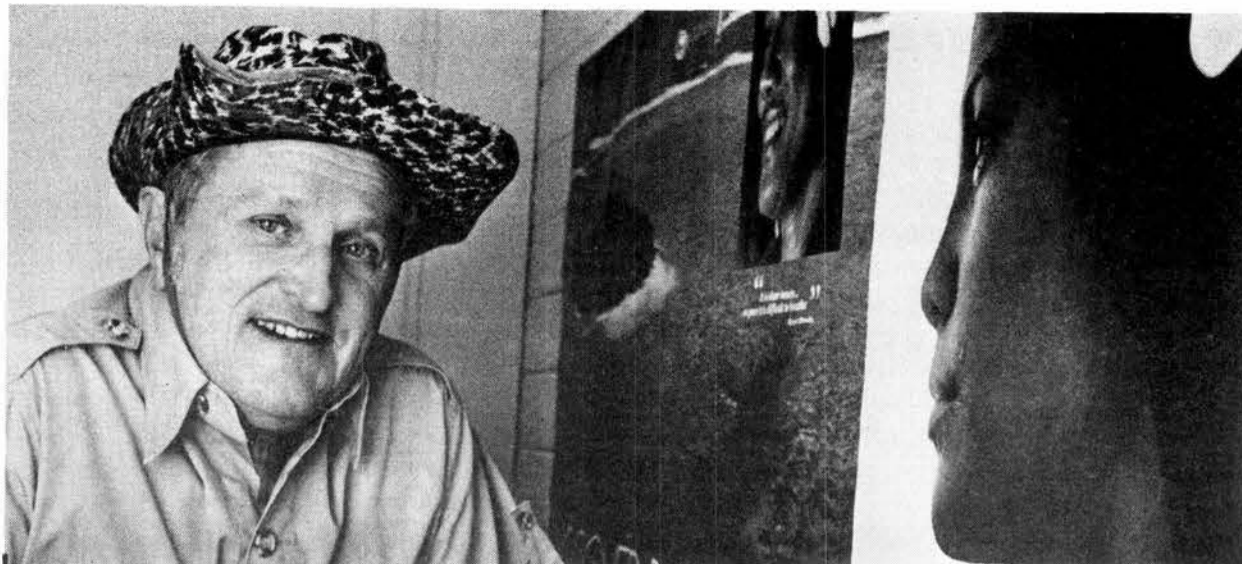
THAT'S NOT ENOUGH for the Thunderbirds, though. Next Monday those card players are back at it at 10:30 a.m. in the Eldorado room. No under-the-table deals at these get-togethers. They call a spade a spade (and a diamond a diamond), so if your heart's in it, come out to the club.

A RETIREMENT SEMINAR will be presented Tues., Jan. 21, at 5 p.m. in Rm. B5 at the Club by Bill Sellers of Prudential-Bache Securities. Call Bill for more info at 881-2323.

THE CORONADO SKI CLUB'S next meeting is Mon., Jan. 21, in the ballroom at 7 p.m. The UNM ski coaches (downhill and x-c) will be featured speakers, and you'll have another chance to take home those fabulous door prizes.

NEXT FRIDAY the two-for-one dinner special features filet mignon or poached halibut. Two dinners, your choice of entree, for the grand total of \$14.95 — a bargain anywhere, unless you plan to stop in at McDonald's that night! Don Lesmen and his group with the big-band sound will take over the C-Club bandstand for the occasion.

WESTERN NIGHT was such a hit a couple of months ago, some folks couldn't be accommodated — the Club was full up for the evening, and some 100 would-be revelers were turned away for lack of reservations. The C-Club crew doesn't like to see anybody disappointed, so another Western Night is scheduled Jan. 25. If you got left out in the cold last time, don't miss it this time around. Call the Club office right now for a reservation, dust off those boots, and get those pre-washed jeans ready to go. The saloon opens at 5 p.m., and a super buffet featuring all-you-can-eat BBQ ribs, western baked beans, coleslaw, and all sorts of goodies straight off the chuck wagon will be available from 6-8 for \$6.95. And, of course, those good old Isleta Poor Boys (who else?) will follow up with c-w music in the OK Corral (the ballroom for you uninitiated).



SOMEDAY, Ed Neidel's (2361) home will sink quietly into the aqueous gravel bed underlying Albuquerque, thanks to the immense mass of *National Geographics* he's stashed away there in the last 30 years. Until then, he and Lu will keep traveling, with the magazines as reference. They've crossed the Atlantic 14 times, the Pacific six, and they've made six trips to the South Pacific. Ed's father was a railroad man in Chicago, so Ed considers his wanderlust part of his genetic makeup. He's eminently qualified to speak on international travel at the Club's first Travel Fair on Jan. 28.

Come Ye to the Fair!

IT'S NEW, it's exciting, and it begins Jan. 28. It's a Travel Fair, and it's designed to give you the wanderlust, then show you how easy the Club makes it for you to deal with your addiction to new horizons. This Travel Fair, the first in a planned quarterly series, allows you to preview the 1986 models of Club-sponsored trips, sign up for confirmed trips, get information on the other trips planned, and suggest future destinations for the Club travel program.

Sharon Mackel (330) will introduce a new Trip Captain Training Program (TCTP), which will eventually serve as a pool from which to pick future trip captains — people who know the ins and outs of group travel, who aren't afraid of hard work and long hours, and who find half-price trips attractive.

All that happens from 5 to 7 p.m. At 7

Hardy Globetrotter Ed Neidel (2361) will present a cram course on the pitfalls, perils, and pleasures of international travel — visas, passports, railroads, airlines, castles, bed-and-breakfasts, how not to get ripped off or stranded, and how to pronounce "Concierge."

In addition, the Fair offers free munchies, coffee, and tea; cheap food and drinks; and fantastic door prizes. The latter go to Club members only; the Fair itself is for all Sandians/DOEans and their nuclear families.

The Travel Fair series is the work of nearly a dozen On-the-Road-Again addicts led by Fair Chair Sharon; board member Marv Plugge (5171) heads the Club's travel program. For more information, call them, respectively and respectfully, on 6-3190 or 6-1477.

TRAVEL — You should be planning right now for a couple of trips coming up this spring:

Rainbow Bridge/Grand Canyon — You can visit Rainbow Bridge National Monument via a boat cruise on Lake Powell in southern Utah and the scenic wonders of the Grand Canyon during a super trip March 22-25. The \$173/person tab covers charter bus round trip, two nights' lodging at Wahweap Marina on Lake Powell, all day boat cruise to Rainbow Bridge (lunch included), a stop at Lee's Ferry in Marble Canyon on the Colorado River, west and east loop tours of the Grand Canyon's south rim, one night at the Thunderbird Lodge (on the rim, with your own terrace for viewing the scenery), and snacks and drinks on the bus every day.

Las Vegas — Back by popular demand, another great bus trip to Las Vegas is scheduled April 20-23. The low, low price of \$122/person covers round trip on the bus, three nights at the luxurious Maxim Hotel in LV, some meals, a tour of Hoover Dam, a stop at Sam's Town in Laughlin, Nev., and — of course — the usual snacks and drinks on the bus throughout the trip. Sign up early for either (or both) of these trips at the Club office.

Congratulations

- Rosalie and Joe (6314) Fernandez, a son, Joseph Anthony, Sept. 21.
- Marcia and Phil (1833) Fuerschbach, a son, Kyle Henry, Dec. 20.
- Angela Padilla (21) and Al Campos, married in Albuquerque, Dec. 13.
- Barbara and Ed (2858) Young, a daughter, Jennifer Nicole, Dec. 21.
- Becky (1500) and Jeff Hunter, a son, Jared Ray, Jan. 3.
- Donna and Marco (7818) Holloway, a daughter, Danielle Renee, Nov. 26.
- Sharla Bertram (6334) and Steve Echols, married in Albuquerque, Dec. 31.
- Susan and Rick (5238) Beckmann, a daughter, Jill Kathryn, Jan. 5.

1986 Holidays

- Memorial Day.....Mon., May 26
- Independence Day.....Fri., July 4
- Labor Day.....Mon., Sept. 1
- Thanksgiving.....Thurs., Nov. 27
- Christmas — New Year Shutdown
Thurs., Dec. 25 through Sun., Jan. 4
(Energy Conservation Day will be observed Fri., Jan. 2, 1987.)